among the earth-particles. Experiments on the growth of the roots of *Solanum tuberosum* showed how the root-system of this plant, when the surroundings are arranged similar to those of an epiphytic vegetation develops in a way like that of a genuine epiphyte. The property of doing so is, as long as the roots live under ordinary circumstances, latent, the adaptation to surroundings giving rise to this new feature of root-life. The facts thus obtained are used by Sachs to explain saltatory biological variations, one of the features of the "struggle for existence." Those who explain each and every property in an organism by the proper selection of species forget that we had the properties, irritabilities, and energies of the organs *before* the selection, or, at least, we ought to search for them. What we understand as the original properties of the organized matter, is not told by anybody, but Sachs is sure, "that certain properties, irritabilities, etc., were originally present, on which the struggle for life, and the natural selection could exert its influence."

It is very interesting to see how Sachs, in the autumn of his life, holds up again experimental physiology before a school of biologists which too often makes deductions concerning general biological laws, adaptations, etc., from facts just as they find them and which does not trace these facts to their origin by means of experiment.—J. CHRISTIAN BAY.

Studies upon the Xyrideæ.

How incomplete our present knowledge is of this family is only too manifest when we examine the literature upon this subject. It seems as if the majority of authors have restricted themselves to mere systematic treatises, as for instance Martius, Kunth, Seubert, Chapman, Grisebach and Ries, while anatomical studies are very few and scattered. The present paper[1] is, therefore, highly welcome, since the author gives us a number of details concerning the morphology and anatomy, besides describing and figuring several new and very interesting species.

The vegetative organs show morphological characters that are not only useful in the discrimination of species, but are also of great interest when considered from a comparative point of view. This is the case for instance with the ramifi-

[1] NILSSON, ALBERT: Studien über die Xyrideen. Kgl. Svenska Vet. Akad. Hdlgr. XXIV. no. 14. pp. 75 pl. 6. Stockholm 1892.

cation of the axis. We have here three forms of shoots: (I) "vegetative-floral," where the leaf-bearing axis is terminated by the inflorescence; (II) "floral," the leaves of which are sheathing and bladeless; and (III) "vegetative," which bears leaves of normal shape, but where no inflorescence becomes developed, at least not in the first year.

The true "vegetative-floral" axis is the main stem itself, the "vegetative," on the contrary, representing a secondary axis. The "floral" shoot is also always secondary, and illustrates a biaxial ramification, such as is known from, for instance, a few species of *Carex*[2], and others of various families. The main-shoot is in these purely vegetative and develops continuously only leaves, from the axils of which the flowering stems become developed.

Most of the species of *Xyris* show the development of a "vegetative-floral" main-axis, while in others the main axis is merely "vegetative." *Xyris savannensis*, however, shows all three forms of shoots upon the same individual. The ramification becomes still more complicated, when two or even three shoots develop in the axil of each leaf; such shoots are either all "floral," or "floral" and "vegetative-floral."

The roots occur in the two forms "typical" and "mechanical," which are, mutually, very different in structure. The first of these show the same plan, with a few modifications which are characteristic of the respective species. Most interesting is the fact, already discovered by Van Tieghem[3], that the pericambium is interrupted by the protohadrome in certain species of *Xyris*. The "mechanical" roots, which were observed in *Abolboda brasiliensis* and some species of *Xyris*, have the central part composed of stereome, besides that the pericambium and the endodermis consist of very thick-walled cells.

The stem is mostly differentiated into an under-ground rhizome with sympodial ramification, and an above-ground, flower-bearing scape. *Xyris witsenioides* forms an exception by having a distinct stem above-ground, the length of

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[2] WYDLER: Ueber die Axenzahl der Gewächse. Botan. Zeitung 1844. See also: CALLME: Ueber zweigliedrige Sprossfolge bei den Arten der Gattung *Carex*. Berichte d. deutsch. bot. Gesells. v. heft 5.

[3] Van Tieghem: Structure de la racine et disposition des radicelles dans les Centrolepidées, Eriocaulées, Joncées, Mayacées et Xyridées. Journal de Botanique I. 305.

which may reach 30^{cm}. The anatomy of the lower part of this stem was, however, like that of a rhizome. The scape varies in outline from terete to triangular, and shows frequently a conspicuous furrowing. The cells of the mechanical tissue differ from typical stereome-cells by their length and having their pores transverse. This has hitherto only been observed in the *Restiaceae*.[4]

The leaves show also several variations. They are, in regard to the arrangement of the tissues, centric, excepting in *Abolboda brasiliensis*, where they are dorsiventral.

The author discusses also the geographical distribution of the various species. While the genus *Abolboda* is restricted to South America, *Xyris* has been recorded from all parts of the world excepting Europe. One hundred and eleven species are enumerated of *Xyris*, and seven of *Abolboda*. Twenty-one are described as new to science.

Among the species of *Xyris* which are enumerated in this paper, several have been named and described by the same author in a previous note, entitled: "Ueber die Afrikanischen Arten der Gattung *Xyris*[5]", to which we hereby take the opportunity to call attention.—THEO. HOLM.

BRIEFER ARTICLES.

Notes from Gull Lake Biological Station of the University of Minn.—ROOTHAIRS IN ELODEA CANADENSIS.—In the absence of my anatomical library and periodicals I cannot say whether the presence of root-hairs in *Elodea* has been made out or not. De Bary in his *Comparative Anatomy* (Eng. tran. p. 55, 1884) seems to except *Elodea* from the root-hair forming plants, saying, "If we disregard the root-hairs which, with very few exceptions (*Elodea*, Lemna, Ophioglosseæ) are universally distributed," etc.; and Van Tieghem in his Traité de Botanique, p. 677, (1891), observes, "quelques plantes se montrent même dépourvues de poils radicaux, aussi bien si la racine est aquatique, comme dans l'Elodée (*Elodea*)." While I do not yet know upon whose observation these statements are based, I can state that they must be corrected, for *Elodea Canadensis* growing in the outlet stream of Cullen lake, Cass

[4] MASTERS: Observations on the Morphology and Anatomy of the Genus Restio. Journ. Linn. Soc. VIII. (1865). Pl. XIV, fig. 1.

[5] Öfversigt af Kgl. Svenska Vet. Akad. Förhdlgr. Stockholm 1891. no. 3. pp. 149-157.